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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,553	05/17/2005	Manfred Ruehrig	1433.125.101/13.305	5911

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EXAMINER
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STARK, JARRETT J

ART UNIT	PAPER NUMBER
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2823

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/03/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/509,553

Applicant(s)

RUEHRIG ET AL.

Examiner

Jarrett J. Stark

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10-29 is/are pending in the application.
- 4a) Of the above claim(s) 18-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/28/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

Applicant's arguments filed 2/7/2007 have been fully considered but they are not persuasive.

The current amendments do not distinctly differentiate the claimed invention from the prior art reference.

In response to the new limitation of "forming an artificial antiferromagnet from the first, second and third layers by the steps of:" Anthony still discloses "the steps of." A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

The transitional term "comprising", which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See, e.g., *Invitrogen Corp. v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1368, 66 USPQ2d 1631, 1634 (Fed. Cir. 2003) ("The transition comprising' in a method claim indicates that the claim is open-ended and allows for additional steps."); *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997) ("Comprising" is a term of art used in claim language which means that the named elements are essential, but other elements may

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be added and still form a construct within the scope of the claim.); *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 229 USPQ 805 (Fed. Cir. 1986); *In re Baxter*, 656 F.2d 679, 686, 210 USPQ 795, 803 (CCPA 1981); *Ex parte Davis*, 80 USPQ 448, 450

In addition, during patent examination, the pending claims must be "given their broadest reasonable interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000). While the claims of issued patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim interpretation to be applied during examination. During examination, the claims must be interpreted as broadly as their terms reasonably allow. *In re American Academy of Science Tech Center*, F.3d, 2004 WL 1067528 (Fed. Cir. May 13, 2004) (The USPTO uses a different standard for construing claims than that used by district courts; during examination the USPTO must give claims their broadest reasonable interpretation.) This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) >; *Chef America, Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1372, 69 USPQ2d 1857 (Fed. Cir. 2004).

Furthermore, "the use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." *In re*

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Heck, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting In re Lemelson, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998).

### ***Claim Objections***

Claim 1 recites the limitation "and third layers ". There is insufficient antecedent basis for this limitation in the claim. As the claim reads, the method comprises forming multiple layer, however the Applicant's do not define a specific third layer.

### ***Claim Rejections - 35 USC § 102***

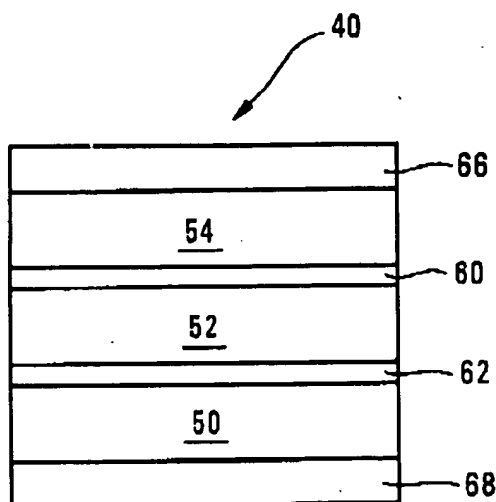
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented<sup>3</sup> or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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**Claim 10** is rejected under 35 U.S.C. 102(b) as anticipated by Anthony et al. (US 6,172,904).



*Figure 3*

**Regarding claim 10,** Anthony et al. discloses a method for fabricating a reference layer for MRAM memory cells, comprising:

providing a layer system for the reference layer, the layer comprising of:

system having a first layer (Fig. 3 layer #66) of a material having a first Curie temperature, wherein the first layer has a saturation field strength and can be permanently magnetized by an external magnetic field, and having a second layer (Fig. 3 layer #68) of a material having a second Curie temperature, which is significantly lower than the first Curie temperature, wherein the second layer can be magnetized by antiferromagnetic coupling with only the first layer (Anthony, Col. 3 line 62 – Col. 4 line 5);

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a very thin intermediate coupling layer between the first and second layers (Fig. 3 layer #62);

forming an artificial antiferromagnet from the first, second and third layers by the steps of :

generating an external magnetic field having a field strength; (Anthony, Col. 4 lines 6 - 19)

cooling the layer system from a temperature above the first Curie temperature to below the first Curie temperature by action of the external magnetic field, the field strength of the external magnetic field being greater than the saturation field strength of the first layer, so that magnetization of the first layer is oriented by a second-order phase transition along the field direction of the external magnetic field; and (Anthony, Col. 4 lines 6 - 19)

subsequently cooling the layer system below the second Curie temperature, magnetization of the second layer being oriented antiparallel with respect to the magnetization of the first layer on account of antiferromagnetic coupling between the first and second layers. (Anthony, Col. 3 line 49 – Col. 4 line 19)

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 11-17 are** rejected under 35 U.S.C. 103(a) as being unpatentable over Anthony et al. (US 6,172,904).

**Regarding claim 11,** Anthony discloses the fabrication method of claim 10, further including setting the net magnetization of the layer system through the choice of a saturation flux, in particular of the layer cross section in each case of the first and second layers. (Anthony, Col. 3 line 33-43)

It is obvious that the net magnetization of the layer is dependent of the composition of the material. The saturation flux is an obvious design choice that is notoriously well known. The ratios of the compositional material control the amount of net spin of the material which accounts for the net saturation flux. For an example please see additional reference Soft High Saturation Magnetization ( $Fe_{0.7}Co_{0.3})_{1-x}N_x$  Thin Films for Inductive Write Heads , by Sun et al.

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal value for the "saturation flux" through routine experimentation and optimization to obtain optimal or desired device performance because the "saturation flux" is a result-effective variable and there is no evidence indicating that it is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See

MPEP 2144.05



Given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation." Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizaka*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

**Regarding claim 12, Anthony** discloses the fabrication method of claim 10, further including setting the net magnetization of the layer system to zero by the respectively identical net magnetization of the first layer and the second layer. (Anthony, Col. 3 line 3-22)

**Regarding claim 13, Anthony** discloses the fabrication of claim 10, further including setting the net magnetization of the layer system to be not equal to zero

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through selection of the second layer such that the layer cross section thereof is smaller than that of the first layer. (Anthony, Col. 3 line 3-22)

**Regarding claim 14,** Anthony discloses the fabrication of claim 10, wherein subsequently cooling the layer system below the second Curie temperature further includes applying an external magnetic field, whose field direction is opposite to the magnetization direction of the first layer, upon passing through the second Curie temperature. (Anthony, Col. 3 line 49 – Col. 4 line 19)

**Regarding claim 15,** Anthony discloses the fabrication method of claim 10, wherein the layer system is further provided with a very thin intermediate coupling layer between the first and second layers, and wherein the antiferromagnetic coupling is imparted by the intermediate coupling layer. (Anthony, Col. 4 lines 32-35)

**Regarding claim 16,** Anthony discloses the fabrication method of claim 10, wherein the material of the first layer is chosen from a group comprising (Co,Fe,Mn).sub.80(Si,B).sub.20; (Co,Fe).sub.83(Si,B).sub.17; and Tb.sub.20Fe.sub.40Co.sub.40, and the material of the second layer is chosen from the group comprising (Co,Fe,Mo).sub.73(Si,B).sub.27; (Ni,Fe).sub.78(Si,B,C).sub.22; and Tb.sub.20Fe.sub.80. (Anthony, Col. 3 lines 35-43), (Anthony, Col. 3 lines 52-61)

**Regarding claim 17,** Anthony discloses the fabrication method of claim 15, wherein the material of the intermediate coupling layer is chosen from the group comprising ruthenium, copper, and gold. (Anthony, Col. 4 lines 32-35)

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**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jarrett J. Stark whose telephone number is (571) 272-6005. The examiner can normally be reached on Monday - Thursday 7:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JJS  
March 24, 2007

  
MICHELLE ESTRADA  
PRIMARY EXAMINER